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IS : 6954 - 1973

Indian Standard

CODE OF SAFETY FOR CAUSTIC POTASH

(First Reprint MARCH 1988)

UDC 614.878:661.312.1

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4 *October* 1973

AMENDMENT NO. 1 DECEMBER 2006
TO
IS 6954 : 1973 CODE OF SAFETY FOR CAUSTIC POTASH

(*Page* 4, *clause* 3) — Insert the following new clause at the beginning and renumber the subsequent clause:

'3.1 General Information

a) Molecular formula	: KOH
b) Molecular weight	: 56.11
c) CAS No	: 1310-58-3
d) UN No.	: 1813/1814'

(*Page* 4, *clause* **4.1**) — Insert the following matter at the end:

'TLV (C) for Caustic Potash is 2 mg/m^3:'

(*Page* 6, *clause* **5.2.5**) — Insert the following new clause after **5.2.5**:

'**5.3 Incompatibles** — Caustic Potash reacts with many organic and inorganic chemicals, such as strong acids, acid chlorides, acid anhydrides, nitroaromatic, nitroparaffin and organohalogen compounds and organic peroxides. Reacts violently with water generating significant heat and dangerously spattering corrosive potassium hydroxide. Violently polymerises acetaldehyde, acrolein or acrylonitrile. Produces flammable and explosive hydrogen gas if it reacts with sodium tetrahydroborate or metals, such as aluminum, tin, or zinc. Produces spontaneously flammable phosphine gas if it reacts with phosphorus. Can form spontaneously flammable chemicals upon contact with 1,2-dichloroethylene, trichloroethylene or tetrachloroethane. Can react explosively with chlorine dioxide, maleic anhydride, nitrogen trichloride, *n*-nitrosomethylurea and tetrahydrofuran. Can produce carbon monoxide upon contact with solutions of sugars, such as fructose, lactose and maltose.'

(CHD 8)

Reprography Unit, BIS, New Delhi, India

Indian Standard

CODE OF SAFETY FOR CAUSTIC POTASH

Chemical Hazards Sectional Committee, CDC 18

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(*Continued on page* 2)

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(*Continued on page* 14)

Indian Standard

CODE OF SAFETY FOR CAUSTIC POTASH

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 11 May 1973, after the draft finalized by the Chemical Hazards Sectional Committee had been approved by the Chemical Division Council.

0.2 Potassium hydroxide (KOH), commonly known as caustic potash is widely used as a reactant in chemical processes. Whether in liquid or solid form or in solution, it causes burns on contact with body tissues.

0.3 Observance of the standard code of safety would eliminate or minimize accidents to a great extent. Apart from the usual common precautions and alertness to be exercised while handling any hazardous chemical, some specific precautions are required which are covered in this code of safety.

0.4 In the preparation of this standard, considerable assistance has been derived from the 'Safety Data Sheet No. SD-10 for Caustic Potash' issued by Manufacturing Chemists' Association, Washington, D.C., USA.

1. SCOPE

1.1 This standard describes properties of caustic potash, the nature of hazards associated with it and essential information on storage, handling, packing, labelling, disposal of waste, cleaning and repair of containers, selection and training of personnel, personal protective equipment and first-aid.

1.1.1 This code does not deal with specification for design of buildings, chemical engineering plants, storage vessels, equipment for operations control and waste disposal.

2. TERMINOLOGY

2.1 For the purpose of this standard the definitions given in IS:4155-1966* shall apply.

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*Glossary of terms relating to chemical and radiation hazards and hazardous chemicals

3. PROPERTIES OF CAUSTIC POTASH

3.1 Some of the important physical and chemical properties are:

a) Physical state	Solid, white to light grey
b) Odour	Odourless
c) Relative density	2·044
d) Melting point	380°C
e) Solubility in water	97 percent at 0°C and 178 percent at 100°C
f) Flammable limits	None
g) Flash point	None
h) Auto-ignition	None
j) Corrosivity	Aqueous solutions are practically non-corrosive to iron and rubber at atmospheric temperatures. Will attack wool, leather and some metals, such as aluminium, tin, lead and zinc
k) Reactivity	Considerable heat is generated when water is added to caustic potash. Boiling and spattering may result. Caustic potash will react with zinc and other metals mentioned above to produce hydrogen gas and can react violently or explosively with many organic chemicals

4. HAZARDS ASSOCIATED WITH CAUSTIC POTASH

4.1 Health Hazards — Caustic potash is a strong alkali and is dangerous when improperly handled. The solid caustic and concentrated solutions are destructive to tissues with which they come in contact. Symptoms of irritations are frequently not evident immediately after contact with caustic potash. Injury may result before one realizes that the chemical is in contact with the body.

4.1.1 *Acute Toxicity*

4.1.1.1 No general or systemic effects are noted, except those associated with shock or those secondary to tissue damage.

4.1.1.2 Caustic potash is a strong primary irritant. Multiple small burns may result from exposure to its dust or mist. Contact with eyes either in solid or liquid forms very rapidly causes severe damage to the eyes.

4.1.1.3 Ingestion of solid caustic potash or its solution results in severe damage to the mucous membranes and deeper tissues causing perforation of tissues. Death may follow if caustic potash penetrates into vital areas.

4.1.1.4 Inhalation of dust or concentrated mist of caustic potash may cause damage to upper respiratory tract and even to lung tissue proper. Effects of inhalation may vary from mild irritation of nasal membranes to severe pneumonitis depending on the severity of the exposure.

4.1.2 *Chronic Toxicity*

4.1.2.1 *Systemic effects* — There are none, except those secondary to tissue damage. These can be minimized or prevented by prompt first-aid measures.

4.1.2.2 *Local effects* — The chronic local effects, that is, those arising from repeated contact with dilute solutions, may consist of multiple areas of superficial destruction of the skin or of primary irritant dermatitis. Similarly, inhalation of the dust or mist may result in varying degrees of irritation of the respiratory tissues.

4.2 Fire and Explosion Hazards

4.2.1 Caustic potash, either anhydrous or in solution, will not burn or support combustion.

4.2.2 Hot molten anhydrous caustic potash may cause charring and subsequent ignition of combustible containers, or pallets.

5. STORAGE AND HANDLING

5.1 Storage

5.1.1 Dry caustic potash may be stored in steel drums or polythene containers.

5.1.2 Caustic potash solution shall be stored in mild steel drums lined throughout with impervious plastic materials, such as polyethylene.

5.1.3 *Indoor Storage* — When filled drums or other containers are stored in separate rooms, trapped floor drains should be provided. The floors should be pitched to the drains and the latter should lead to a safe location.

5.2 Handling

5.2.1 *General* — Owing to the high corrosive nature of caustic potash utmost care should be taken in avoiding its contact with the body tissues.

5.2.2 *Spills and Leakage* — Wherever caustic potash is stored, unloaded, handled or used, abundant water, preferably running water, should be available for emergency use in dissolving or diluting or flushing away spilled caustic potash. Dilute acid, preferably acetic acid, may be used to neutralize the final traces of caustic potash immediately after flushing.

5.2.3 *Preparation of Solution* — When preparing solution or diluting concentrated commercial solution, caustic potash should always be added slowly to water and in small proportions to avoid violent boiling and spattering. Hot water shall not be used under any circumstances. Eyes, face, neck and hands shall be protected. The solution shall be kept agitated continuously while adding caustic potash to it.

5.2.4 *Addition of Caustic Potash to Reaction Batch* — When caustic potash is added to any reaction mass or batch with potential exothermic heat of reaction, solution should be used in preference to solid caustic potash whenever possible. If solid caustic has to be used, it is recommended that precautions be taken to insure against a too rapid rate of addition consistent with the agitation characteristics of the vessel used, and that a suitable screen or grate be employed to prevent large fused lumps from accidentally falling into the vessel manhole. Failure to observe these precautions may lead to a violent uncontrolled chemical reaction with possible serious consequences to both personnel and equipment.

5.2.5 The packing material and lubricant for pumps, glands, etc, shall be of a material recommended for caustic potash handling. The pump glands, fittings and valve stems shall be provided with splash board collars in cases where personnel may be exposed to caustic potash leaks and sprays.

6. LABELLING

6.1 All containers (including tanks, cars) of caustic potash shall bear the label as given in Fig. 3 of IS: 1260 (Part I)-1973*. The lower half of the label shall have the following words printed. Any other label or warning or other statement required by statutes, regulations or ordinances, is also to be used in combination or separately.

CAUSTIC POTASH
(Potassium Hydroxide)

DANGER : CAUSES SEVERE BURNS.

Do not get in eyes, on skin, on clothing.
Avoid breathing mists or sprays.
Do not take internally.
When handling, wear goggles or face shield.
While making solutions, add slowly with agitation to surface of solution to avoid violent spattering.
In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, call a physician. Remove contaminated clothing or shoes, and wash before re-use.

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*Pictorial markings for handling and labelling of goods: Part I Dangerous goods.

7. PREVENTIVE MEASURES

7.1 General — Personnel engaged in handling caustic potash should be fully trained for safe handling of the materials and should be supervised by adequately trained persons. The personnel should use the protective equipment and take adequate safety measures. If such precautions are ignored and carelessness tolerated, caustic potash is capable of producing serious injury.

7.2 Environmental Control — Ventilation of the work area, where caustic potash mist or dust is present, is essential. There should be no evidence of skin, eyes, nose or throat irritation.

7.3 Personal Hygiene

7.3.1 Personnel should practise good personal hygiene to prevent exposure to caustic potash from contaminated clothing.

7.3.2 Facilities for personal cleanliness should be provided for thorough washing before lunch and the end of work day.

7.4 Engineering Control of Hazards

7.4.1 Building Design

7.4.2 Hazards from leaks and spills should be minimized by having an adequate supply of water for washdown. Drainage of hard-surfaced or diked areas should be directed so as to minimize the exposure to personnel and equipment. Floors of structures above grade level should be solid and have controlled drainage. Extreme care should be exercised when water is added to concentrated or molten caustic potash.

7.4.3 *Equipment Design* — Because of the corrosivity of caustic potash the technical problems of designing equipment, determining materials of construction, and formulating procedures which provide adequate safety and economy should be handled by experienced engineering and safety personnel. Manufacturers of caustic potash and of the equipment in which it is to be used are usually prepared to help with these problems and to assist in designing and maintaining safe working conditions.

7.4.3.1 To minimize accidental leakage, spillage or splashing of caustic potash solutions through apparatus failures, only the best materials and workmanship should be employed. Improperly designed or improperly stress-relieved fusion-welded steel equipment is subject to caustic embrittlement upon prolonged contact with hot concentrated caustic solutions.

7.4.3.2 Storage tanks should be located so that pipelines can be as short as possible. The number of joints should be reduced to a minimum and these should be flanged rather than screwed connections.

7.4.3.3 Pipelines in the open, or exposed to temperatures below the crystallization point of the caustic solution, should be steam-traced. Pipelines should be installed with sufficient gradient to permit complete drainage after use. They may be of iron, nickel, nickel-iron or nickel-copper alloys. Copper, brass, bronze, zinc, lead or aluminium in valves or fittings shall not come into contact with caustic potash.

7.4.4 *Ventilation* — Areas where caustic potash mist or dust is present should be provided with adequate ventilation to minimize exposure to personnel. There should be no evidence of skin, eyes, nose or throat irritation.

7.4.5 *Air Analysis*

7.4.5.1 Analysis of the air for caustic potash dust or mist will give a measure of personnel exposure and the effectiveness of engineering control.

7.4.5.2 When checking concentrations of caustic potash mist or dust in the atmosphere, care is required to make certain that the sample is representative of the air breathed by the workers and of the daily fluctuations which may occur.

7.4.6 *Electrical Equipment* — Electrical equipment used in caustic potash service should be designed to prevent deterioration and electrical shorting which can result from accumulations of caustic potash on wiring and on terminals. Protective enclosures or splash walls should be used in critical exposure areas.

7.5 Employee Education and Training

7.5.1 Safety in handling caustic potash depends, to a great extent, upon the effectiveness of employee education, proper safety instructions, intelligent supervision and the use of safe equipment.

7.5.2 The education and training of employees to work safely and to use the personal protective equipment or other safeguards provided for them is the responsibility of supervision. Training classes for both new and experienced employees should be conducted periodically to maintain a high degree of safety in handling caustic potash.

7.5.3 Workers should be thoroughly informed of the hazards that may result from improper handling of caustic potash. They should be cautioned to prevent spills and thoroughly indoctrinated regarding proper actions to take, in case they occur. Each employee should know what to do in an emergency and should be fully informed as to proper first-aid measures.

7.6 Personal Protective Equipment

7.6.1 *Availability and Use* — While personal protective equipment is not a substitute for good safe working conditions, adequate ventilation and intelligent conduct on the part of those working with caustic potash, it is in many instances, the only practical means of protecting the worker, particularly in emergencies. Workmen should be taught that personal protective equipment protects only the person wearing it, and that other unprotected personnel in the area may be exposed to danger.

7.6.1.1 The correct usage of personal protective equipment requires the education of all workmen in proper employment of the equipment available to them.

7.6.1.2 Under conditions which require personal protective equipment, its use should be carefully supervised and the type of protective equipment selected should be capable of control over any potential hazard.

7.6.1.3 The following personal protective equipment should be used when indicated.

7.6.2 *Eye Protection*

7.6.2.1 *Chemical safety goggles* — Plastic, cup-type, or rubber-framed goggles equipped with approved impact-resistant type glass or plastic lenses should be worn whenever there is danger of caustic potash coming in contact with the eyes. Goggles should be carefully fitted and shall be adequately vented with air vents designed so that liquid chemicals cannot enter.

7.6.2.2 *Spectacle-type safety glasses* — Metal or plastic frame safety spectacles with prescribed safety lenses may be worn under chemical safety goggles but should not be worn alone for protection against splashes, mist, or dust from caustic potash.

7.6.2.3 *Face shields* — Plastic shields with forehead protection may be worn in addition to goggles where complete protection is desirable. Chemical safety goggles should always be worn as added protection where there is danger of material striking the eyes from underneath or around the sides of the face shield.

7.6.3 *Respiratory Protection* — Severe exposure to caustic potash may occur in handling and packaging operations, in tanks during equipment cleaning and repairs, when decontaminating areas following spills, or in case of failure of piping or equipment. Employees who may be subject to such exposure should be provided with proper respiratory protection and trained in its use and care. Filter or dust type respirators are sufficient for protection against caustic mists or dust.

(SALES)

7.6.4 *Head Protection* — 'Hard' hats should be worn where there is danger from falling objects. Brims on hard hats offer some protection against liquid leaks and splashes from above (aluminium hats are not suitable in caustic areas because of corrosion potential).

7.6.5 *Foot Protection* — Safety shoes or boots made of rubber, neoprene or other caustic-resistant materials with built-in steel toe caps are recommended for workers handling caustic potash in drums or in process areas where caustic potash may leak (leather is attacked by caustic potash, resulting in possible destruction of leather and chemical exposure to the individual).

7.6.6 *Safety Showers and Eye-Wash Fountains* — Safety showers and eye-wash fountains should be available at any location where skin or eyes contact with caustic potash can occur.

7.6.7 *Body, Skin and Hand Protection* — Single or repeated contact with dilute solutions, mist or dust particles of caustic potash may cause primary irritant-type dermatitis. This merely represents a mild inflammatory response of the tissues to exposures of low concentration. Repeated exposures may result in an eczematoid condition of the skin, which may require prolonged treatment by dermatologist. Therefore, it is imperative that contaminated clothing be removed promptly and laundered before re-use. Affected areas of the body should be washed immediately and thoroughly with copious amounts of water. As a general hygienic measure, facilities for personal cleanliness should be provided. Washing before lunch and at the end of the day should be required. Clothing made of materials, such as rubber, neoprene, or vinyl may be worn to protect the body against caustic potash splashes. These garments should be cleaned, inside and out, each time they are used.

7.6.8 Rubber, vinyl or neoprene hand protection should be used for contact with drums or process equipment handling caustic potash. Gloves should be thoroughly washed and aired out after use each day and immediately after any suspected internal contamination.

7.7 Fire Fighting — Although caustic potash is non-combustible and will not support combustion, fire extinguishing equipment should be available to workmen in all process or storage areas where combustible material of any kind is present.

8. FIRST-AID

8.1 General — Speed in removing caustic potash is of primary importance. First-aid treatment should be started at once in all cases of contact with caustic potash in any form or serious injury may result. All cases which involve eyes contact should be referred to a physician.

8.2 Contact with Skin and Mucous Membranes — The emergency safety shower should be the first step and should be used immediately. Clothing can be removed later under the shower. If there is caustic potash on the head and face, do not remove goggles until after this area has been thoroughly flushed with water. Get the caustic potash off with very large quantities of water. Under the safety shower, remove all clothing. Wash skin areas with large quantities of water. Continue washing for as long as one to two hours or until medical help arrives. No salves or ointments should be applied to chemical burns for at least 24 hours. Clothing and shoes that have been wet with the caustic potash should not be worn until after they have been thoroughly washed and decontaminated. A physician should see all cases other than minor exposures.

8.3 Contact with Eyes — If even minute quantities of caustic potash, either in solid form or in solution, enter the eyes, they shall be irrigated immediately with copious amounts of water for a minimum of 15 minutes. The eyelids shall be held apart while the patient rolls the eyes in a circular motion during the irrigation to ensure contact of water with all the tissues of the surface of the eyes and lids. A physician shall be called in attendance at the first possible moment. If a physician is not immediately available, the eyes irrigation shall be continued for a further period of 15 minutes. After the first 15-minute period of irrigation it is advantageous to wash with boric acid solution, then as a first-aid measure, instil two or three drops of 0·5 percent pontocaine solution or an equally effective aqueous topical anæsthetic. No oils or oily ointments shall be instilled unless ordered by the physician.

8.4 Oral Intake — Ingestion of caustic potash causes severe burns of the mucous membranes of the mouth, throat, œsophagus and stomach. Dilution of the chemical by drinking large quantities of water or milk may be attempted. Following this, dilute vinegar or fruit juice may be given to accomplish neutralization. Vomiting may occur spontaneously but shall not be induced nor should a stomach tube be inserted except on the advice of a physician.

8.5 Inhalation — If discomfort is experienced from exposure to caustic potash mist or dust, the employee shall leave the contaminated atmosphere until proper ventilation is restored, and report for medical evaluation.

9. TANK CLEANING AND REPAIRS

9.0 General — This work is probably the most hazardous of all operations which involve the use or handling of caustic potash in industry. All precautions pertaining to education, protective equipment and health should be reviewed and understood.

9.1 Preparation of Tanks and Equipment

9.1.1 Tanks and equipment cleaning should be under the direction of thoroughly trained personnel who are familiar with all of the hazards and the safeguards necessary for the safe performance of this work.

9.1.2 Tank and equipment, pumps, lines and valves should always be drained and thoroughly flushed with water before being repaired. Workmen should never attempt to repair equipment while it is in operation and the lines full. If pipe sections are to be removed and flanges opened, the lower bolts should be loosened first; and although the lines have been flushed, care should be taken to avoid contact with the liquid draining or dripping from the lines. All spillage from the lines or equipment should be removed immediately by flushing to the drain with large quantities of water.

9.1.3 The tank or equipment to be repaired should first be emptied of all liquid, and all pipes leading to and from the tank (except vents) after draining should be disconnected or blanked off. Agitation motor line switches should be locked open.

9.1.4 The tank should be purged with fresh air and the air should be tested by an approved method to ensure that sufficient oxygen is present and flammable gases or vapours absent before personnel are permitted to enter.

9.2 Entering the Tank

9.2.1 No one should enter a tank or confined space until a work permit has been signed by an authorized person indicating that the area has been tested and found to be safe. Furthermore, no workman should enter a tank or vessel that does not have a manhole opening large enough to admit a person wearing a safety harness, life line and emergency respiratory equipment. It should be ascertained that the tank or vessel can be left by the original entrance.

9.2.2 One man on the outside of the tank should keep the personnel on the inside under observation and another man should be available nearby to aid in rescue if any of the men inside the tank are overcome.

9.2.3 A supplied-air or self-contained breathing apparatus, together with a harness and life line, should always be located outside the tank entrance for rescue purposes, regardless of the type of respiratory equipment or air supply which is provided for the employees inside the tank.

9.2.4 Special ventilation is recommended during the entire time the men are cleaning, repairing, or inspecting the tank. Ventilation can be accomplished by exhausting or venting vapours from the bottom of the tank either by its bottom opening or by means of an air mover where tanks have a top opening only.

of BIS - HQ (SALES)

9.2.5 On tanks having only a top opening, care shall be exercised to ensure complete removal of vapours from the entire tanks. Care shall also be taken to avoid having exhaust gases recycled into the tank.

9.2.6 In all cases, if repair work is interrupted, the tank atmosphere should be checked thoroughly and a new work permit issued before resumption of work.

9.3 Emergency Rescue — Under no circumstances should a rescuer enter a tank to remove a victim of over-exposure without proper respiratory equipment, a safety harness and an attached life line. The free end of the life line should be manned by an attendant located on the outside of the tank. Another attendant should be immediately available to assist in the rescue if needed. The rescuer should be in view of the outside attendant at all times or in constant communication with him.

9.4 Exterior Repair Work — Exterior tank repairs, including repairs to steam coils, cutting, riveting and welding, should be permitted only after thorough cleaning and testing of the tank to make certain that it is free of flammable vapours and after a work permit has been issued by an authorized person.

10. WASTE DISPOSAL

10.1 All regulations enforced by duly constituted authority should be determined and complied with.

10.2 Waste caustic potash solutions should not be discharged directly to the sewers and streams. The caustic potash should first be converted to a neutral salt as by neutralization with an acid, and then well diluted to render the waste less harmful.

10.3 Discharge of strong alkali to biological effluent treatment system could upset operating conditions. Discharge of strong alkali to a stream could cause fish kill and be harmful to downstream users.

(*Continued from page* 2)

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DR K. V. NAYAR	Fertilizers & Chemicals Travancore Ltd, Udyogamandal (Kerala State)
DR J. XAVIER (*Alternate*)	
SHRI Y. R. PAKKALA	Fertilizer Corporation of India Ltd, Bombay
SHRI S. S. RAMASWAMY	D.C.M. Chemical Works, New Delhi
DR R. K. GUPTA (*Alternate*)	
DR S. R. SRINIVASAN	Polyolefins Industries Ltd, Bombay
SHRI T. R. SRINIVASAN	Herdillia Chemicals Ltd, Bombay
SHRI S. K. GANGOPADHYAY (*Alternate*)	
SHRI K. K. SUBRAMANIAM	National Organic Chemical Industries Ltd, Bombay
SHRI P. CHAWLA (*Alternate*)	
DR S. I. TARAPOREWALA	The National Rayon Corporation Ltd, Bombay
SHRI L. M. DESHMUKH (*Alternate*)	

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones : 3 31 01 31, 3 31 13 75 Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	***Telephone***
*Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95
†Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43 3 16 41
Southern : C. I. T. Campus, MADRAS 600113	41 24 42 41 25 19 41 29 16
Branch Offices :	
Pushpak,' Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48 2 63 49
'F' Block, Unity Bldg, Narasimharaja Square, BANGALORE 560002	22 48 05
Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003	6 27 16
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5 Ward No. 29, R. G. Barua Road, 5th Byelane, GUWAHATI 781003	—
5-8-56C L. N. Gupta Marg, (Nampally Station Road), HYDERABAD 500001	22 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71 6 98 32
117/418B Sarvodaya Nagar, KANPUR 208005	21 68 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
Hantex Bldg (2nd Floor), Rly Station Road, TRIVANDRUM 695001	52 27
Inspection Office (With Sale Point):	
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 410005	5 24 35

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*Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 28

†Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 27 68 00

Reprography Unit, BIS, New Delhi, India